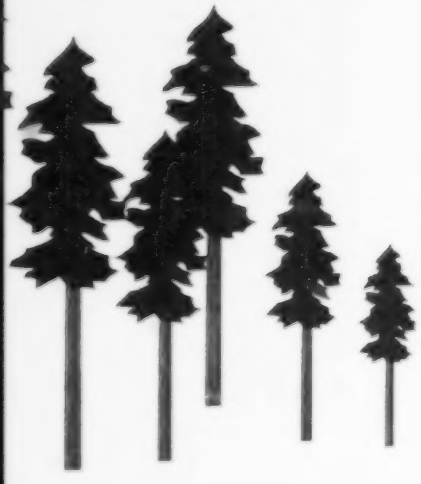
BRITISH COLUMBIA

Ministry of Forests

Market Pricing System

Coast



January 16, 2004

Revenue Branch

MARKET PRICING SYSTEM - COAST

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MARKET PRICING SYSTEM - COAST

The purpose of this paper is to provide a general overview of the Coast Market Pricing System.

This paper is only intended to be a general overview of the Coast Market Pricing System. It does not provide the basis for calculating stumpage rates nor should it be used as guidance for interpreting the legal policies and procedures for calculating stumpage rates, which are contained in the *Coast Appraisal Manual* (CAM). The CAM contains the policies and procedures referred to in Section 105 of the *Forest Act*.

1. THE MARKET PRICING SYSTEM

Starting on February 29, 2004, stumpage rates on the Coast will be determined using the Market Pricing System (MPS).

The central concept which underlies the MPS is that auctions of standing timber establish the market value of the timber, and those market values can then be used to determine the stumpage price for the timber harvested under long-term tenures.

Technically, MPS is a "transaction evidence pricing" system. The evidence from transactions (i.e., the results of the auction sales) is used to determine the price of other stands of timber.

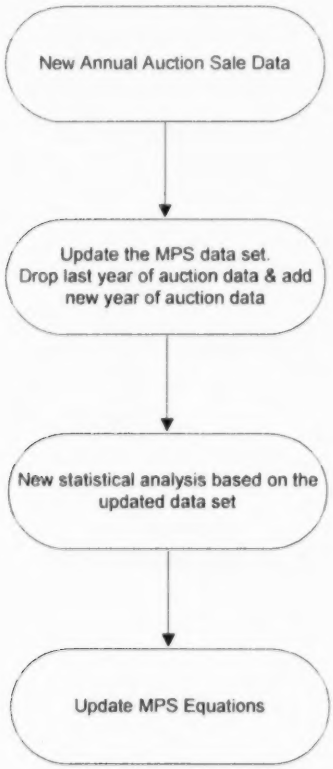
Pricing systems like the MPS are common. The U.S. Forest Service and many states in the U.S. use similar approaches to appraise standing timber. In the market for crude oil, the benchmark price for West Texas intermediate crude oil is established on the New York Mercantile Exchange, and this price is adjusted to value oil with different characteristics (e.g., sulphur content, viscosity, etc.). Finally, each day in the stock market some shares in each firm are bought and sold and the results of those transactions are used to establish the value of all the shares that were not sold.

To implement this concept, the ministry created a database of recent Coast auction sales. The database contains, for each auction sale, the winning bid and data on the characteristics of the sale (e.g., slope, species, volume, etc.). Then, using statistical analysis, the winning bids have been correlated with the timber characteristics and market information (e.g., log prices) to develop equations that predict the market value of a stand of timber.

Over time, as new and more auction sales take place, the MPS will be updated to incorporate the information from the new sales.

This update procedure is illustrated in Figure 1.1, below. Each year, new data is available from recent auction sales. The database is updated by adding the new data from recent auction sales and removing the oldest data. Statistical analysis is then employed to update the MPS equations.

Figure 1.1, MPS Update Methodology


New Annual Auction Sale Data
Update the MPS data set. Drop last year of auction data & add new year of auction data
New statistical analysis based on the updated data set
Update MPS Equations

With the MPS equations, the market value of timber can be estimated, using the procedure illustrated in Figure 1.2.

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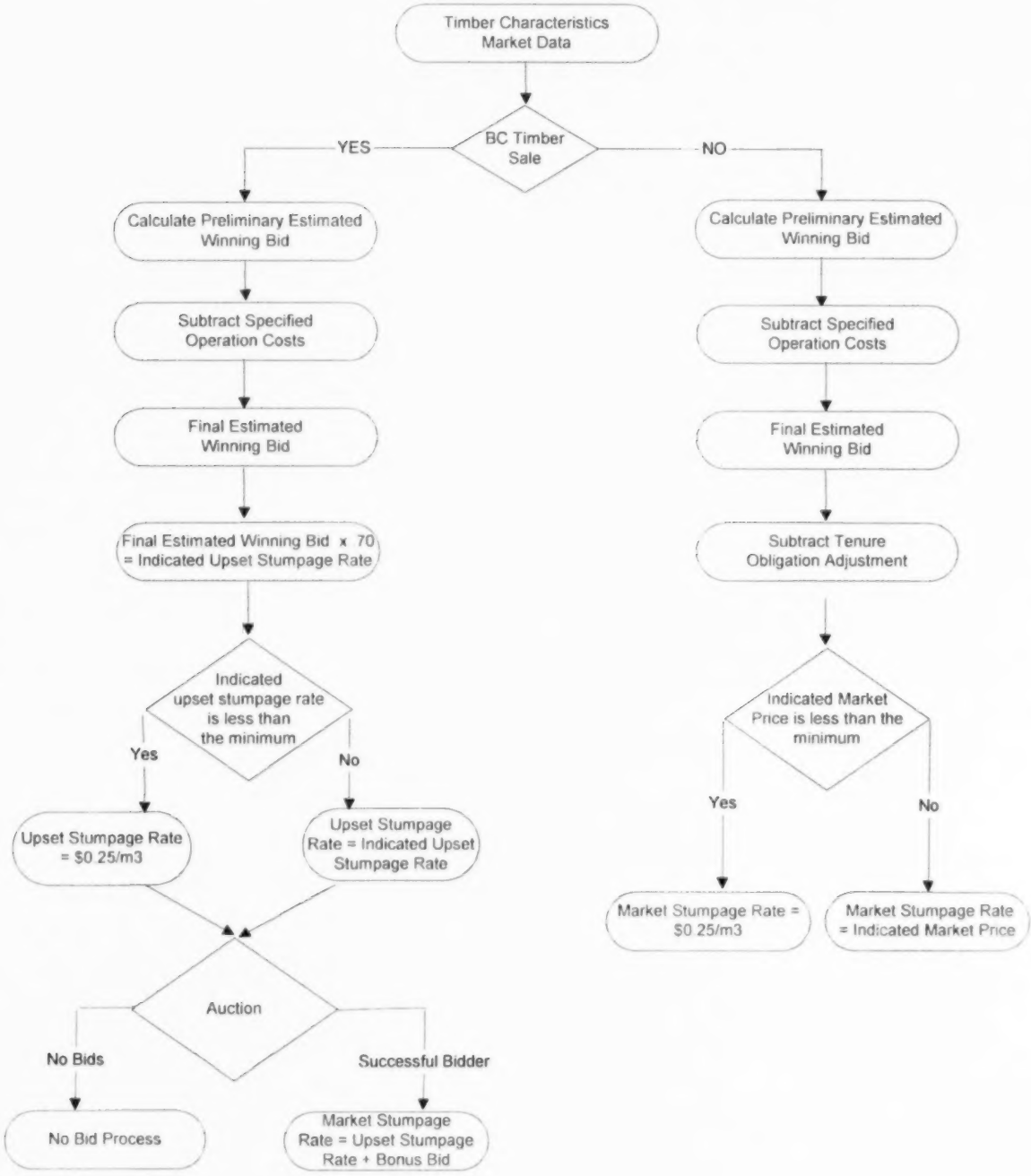
Figure 1.2, MPS Methodology


Timber Characteristics
Market Data
BC Timber Sale
YES
NO
Calculate Preliminary Estimated Winning Bid
Subtract Specified Operation Costs
Final Estimated Winning Bid
Final Estimated Winning Bid x 70 = Indicated Upset Stumpage Rate
Indicated upset stumpage rate is less than the minimum
Yes
No
Upset Stumpage Rate = $0.25/m3
Upset Stumpage Rate = Indicated Upset Stumpage Rate
Auction
No Bids
Successful Bidder
No Bid Process
Market Stumpage Rate = Upset Stumpage Rate + Bonus Bid
Calculate Preliminary Estimated Winning Bid
Subtract Specified Operation Costs
Final Estimated Winning Bid
Subtract Tenure Obligation Adjustment
Indicated Market Price is less than the minimum
Yes
No
Market Stumpage Rate = $0.25/m3
Market Stumpage Rate = Indicated Market Price

2. NEW APPRAISALS

For new cutting permits or timber sales, the main steps in the methodology for calculating the market stumpage rate is as follows:

STEP 1:
Timber Characteristics
Market Data

To calculate the stumpage rate for a new cutting permit or timber sale licence, the first step is to collect data about the timber. The data includes information on the species of trees, location, log prices, harvesting system, slope, etc. All of the information is statistically important in estimating timber value (see Appendix 1 for a List of Variables for which data is required).

At the time a licensee applies for a cutting permit (or BC Timber Sales is preparing a new auction sale), the licensee supplies the necessary data.

STEP 2:
Calculate Preliminary Estimated
Winning Bid

Next, a preliminary estimated winning bid is calculated for the timber (see the statistical equation in Appendix 2 that is used for this calculation) using the data from STEP 1. This equation, based on previous auction sales, estimates the market value or expected bid price of the timber, if the timber were sold at auction.

Given the estimated bid, the estimated number of bidders is then determined (see the statistical equation in Appendix 3 that is used for this calculation). This equation estimates the number of bidders for the sale based on site and market factors (i.e., location, percent second growth, percent cable logging, etc.), if the timber were sold at auction.

The estimated winning bid is then repeatedly recalculated (using the latest estimate of the number of bidders and the estimated winning bid) until the preliminary estimated winning bid does not change.

STEP 3:
Final Estimated
Winning Bid

The final estimated winning bid is calculated by subtracting the estimated cost of specified operations (these are unique logging systems or situations that are not represented in the auction data used to derive the MPS equations).

For example, there are no auction sales that have been harvested with skyline logging systems. Therefore, an adjustment is made to account for the extra cost of skyline logging if a cutting permit or timber sale licence will be harvested with this system.

STEP 4:
Final Estimated Winning Bid x .70
= Indicated Upset Stumpage Rate

For new auction sales, the upset rate is set at 70 percent of the final estimated winning bid to give the starting point for the auction bidding process.

STEP 5:
Market Stumpage
Rate = Upset Stumpage Rate +
Bonus Bid

The highest bonus bid from the auction is then added to the upset rate to give the market stumpage rate. This rate is then charged for all coniferous saw logs that are harvested from the sale.

STEP 6:
Market Stumpage Rate

For timber sold under long-term tenure, the final estimated winning bid (STEP 3) is reduced by the amount of the tenure obligation adjustment, to give the market stumpage rate. This rate is then charged for all coniferous saw logs that are harvested from the cutting permit.

Tenure obligation adjustments are necessary for timber sold under long-term tenure because, unlike bidders in an auction, the licensee is generally responsible for the cost of planning, main road building and silviculture.

For example, a licensee may spend $25 per cubic metre planning, building road access to, and reforesting a particular cutting permit. If the bidder in an auction had to absorb this cost (which they do not), the expected bid would be $25 per cubic metre less.

3. REAPPRAISALS

If circumstances change significantly on a cutting permit (for example, helicopter logging is now required instead of conventional logging), the stumpage rate will be redetermined using the same procedure as for new appraisals. Any changes in the data, market prices or policy will be considered in the reappraisal.

4. MARKET STUMPAGE ADJUSTMENTS

Every three months (January 1, April 1, July 1 and October 1), the stumpage rate for each cutting permit will be adjusted to account for changes in the prices of logs.

The stumpage rate will be recalculated using the current applicable log prices but without changing the appraisal data and stumpage formula.

5. SUMMARY

The introduction and implementation of the MPS is a significant change in Coast forest policy.

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APPENDIX 1

List of Variables

Predicted Bid	Estimated winning bid for the cutting authority ($/m^{3}).
3-Month Average Log Selling Price	Average coniferous log selling price estimate ($/m^{3}) based upon log grades and species for the cutting authority area, and schedules of log market values collected and published by Revenue Branch.
2nd Growth Fir %	The fraction of the coniferous cruise volume that is second growth Douglas-fir.
2nd Growth Hembal %	The fraction of the coniferous cruise volume that is second growth hemlock.
Old Growth Hembal %	Fraction of coniferous cruise volume that is old growth hemlock and balsam.
Slope	Average side slope percentage for the cutting authority area that is not harvested by helicopter.
Volume per Hectare	Volume per hectare in m^3/ha. Calculated by dividing the total net coniferous cruise volume (m^3) by the total merchantable area (ha).
Helicopter Logging %	Fraction of the total net cruise volume (which includes deciduous volume) that is required to be helicopter yarded plus the volume yarded by skyline (i.e., logs fully suspended) greater than 600 m straight line yarding distance measured from the centre of the closest possible landing into the cut block.
Haul Distance	Truck haul distance (km).
Number of Bidders	Estimated number of bidders that would compete for the cutting authority.
Volume	Total net cruise volume of coniferous timber (m^3).
Cable Yarding %	Fraction of the total net cruise volume (which includes deciduous volume) that needs to be cable yarded.
Cruise Grades	Cruise Grades = 1, where 50 percent or greater of the total net cruise volume has used the cruise compilation as the source of log grades for the appraisal, otherwise Cruise Grades = 0.
Location	The straight line distance (km) from the geographic centre of the cutting authority area to the nearest location listed below: Vancouver, Chilliwack, Merritt, Victoria, Nanaimo, Campbell River, Prince Rupert, Terrace, Houston.
Barge Distance	Barge distance is the barging distance (km) between the appraised point of origin and the point of appraisal for the cutting authority area.

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APPENDIX 2

MPS Coast Equation –Winning Bid

Dependent Variable: Real Winning Bid (for stands > 2,500 m3)
Method: Least Squares
Sample: January 1, 1999 to December 31, 2002
Included observations: 248
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-22.14037	5.944577	-3.724466	0.0002
Cruise Grades	3.460424	1.651467	2.095363	0.0372
2nd Growth HemBal_%	-19.00256	4.440790	-4.279094	0.0000
3-Month Average Log Selling Price	0.784393	0.061253	12.80572	0.0000
*LN (Old Growth HemBal_% + 0.01)	-2.879611	0.605312	-4.757236	0.0000
Slope	-0.166169	0.052742	-3.150589	0.0018
Helicopter Logging_%	-40.09100	3.506940	-11.43190	0.0000
*LN(Volume per Hectare/1000)	11.94704	1.827940	6.535793	0.0000
*LN(Number of Bidders)	10.06841	1.477136	6.816169	0.0000
Haul Distance	-0.034161	0.020904	-1.634167	0.1036
Barge Distance	-0.011281	0.002742	-4.114145	0.0001

R-squared	0.757806	Mean dependent var	44.39302
Adjusted R-squared	0.747587	S.D. dependent var	22.83775
S.E. of regression	11.47385	Akaike info criterion	7.761359
Sum squared resid	31200.86	Schwarz criterion	7.917196
Log likelihood	-951.4085	F-statistic	74.15553
Durbin-Watson stat	1.608942	Prob(F-statistic)	0.000000

*LN means natural logarithm.

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APPENDIX 3

MPS Coast Equation – Number of Bidders

Dependent Variable: Number of Bidders
Method: Least Squares
Sample: January 1, 1999 to December 31, 2002
Included observations: 248
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.241721	0.657234	0.367785	0.7134
Location	-0.006391	0.002700	-2.367201	0.0187
2nd Growth Hembal %	2.145033	0.815768	2.629465	0.0091
*LN (Volume/1000)	0.834071	0.204916	4.070310	0.0001
Cable Yarding %	-1.588758	0.354653	-4.479757	0.0000
2nd Growth Fir %	2.889571	0.549288	5.260580	0.0000
Predicted Bid	0.097253	0.008680	11.20385	0.0000

R-squared	0.533159	Mean dependent var	5.931452
Adjusted R-squared	0.521536	S.D. dependent var	3.432303
S.E. of regression	2.374162	Akaike info criterion	4.594986
Sum squared resid	1358.431	Schwarz criterion	4.694155
Log likelihood	-562.7782	F-statistic	45.87257
Durbin-Watson stat	2.244846	Prob(F-statistic)	0.000000

*LN means natural logarithm.